Consommation et Affaires commerciales Canada
Consumer and Corporate Affairs Canada

Bureau des brevets
Patent Office

Ottawa, Canada
K1A 0C9

(21) (A1) 2,080,317
(22) 1992/10/09
(43) 1993/04/11

5,031,5/16

(51) INTL.CL.[5] B32B-007/14; B29C-065/68; B29C-065/02; B65D-065/38

(19)(CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Transparently Bonded Polyester Film and Containers Provided with a Finish of Those Films

(72) Schaefer, Helmut - Germany (Federal Republic of) ;
Buttkus, Erwin (Deceased) - Germany (Federal Republic of) ;

(73) Hoechst Aktiengesellschaft - Germany (Federal Republic of) ;

(30) (DE) P 41 33 627.5 1991/10/10

(57) 20 Claims

2080317

TRANSPARENTLY BONDED POLYESTER FILM AND CONTAINERS PROVIDED WITH A FINISH OF THOSE FILMS

Background of the Invention

Field of the Invention

The invention relates to transparently bonded polyester films which are useful as all-around labels for containers, the transparency of the bond zone being retained even under the action of heat and in a humid atmosphere. The invention also relates to containers provided with a finish based on these films.

Description of Related Art

It is known to print some types of plastic films in transparent form and to bond these using an adhesive to give tubes or the like, without having to accept losses in transparency in the bonded overlap zone of the films.

Film tubes of this type are used, inter alia, as all-around labels, safety seals or sheaths for providing containers, such as bottles, tubes, jars, and similar articles, with a finish which is effective for advertising purposes.

Films based on polyvinyl chloride (PVC), polystyrene (PS) and polypropylene (PP) are very suitable for this purpose since they can be bonded easily and the bonding zones also are clean and, above all, transparent and, thus, do not have an adverse effect on the optical impact of a bonded 360° all-around label.

Currently, polyester containers are finding increasing acceptance in the market, since these give rise to fewer problems with regard to environmental pollution. It is true that containers of this type based on polyester can be provided without any problem with the above-mentioned container finishes based on PVC, PS or PP

film, but this has the concomitant disadvantage that the polyester containers finished in this way are no longer of a single material type, i.e., they no longer consist of a single raw material and thus are virtually no longer recyclable.

There is therefore a need to find polyester films useful as the finishing films of containers, particularly polyester containers, which films are in no way inferior to the PVC, PS or PP films, and in particular, that can be bonded with retention of the transparency in the bonding zone.

This was not possible hitherto since, to date, it was only possible to bond transparent polyester films in a manner that resulted in clearly optically visible cloudiness as a result of crystallization streaks.

It is true that bonded colored, non-transparent polyester films are known for applications not requiring stringent optical requirements, but these are not adequate for use as finish and decoration material.

Summary of the Invention

An object of the present invention was, therefore, to find a method that allows for transparent polyester films to be firmly bonded with adhesives while retaining the transparency in the bonded film zone. A further object of the invention was to carry out this bonding in such a way that the transparency in the bonding zone is retained even in the case of a subsequent heat treatment, for example, shrinkage or pasteurization.

A further object of the present invention is to provide a polyester tube that retains its transparency even in the region of overlap of the initial film.

It is further an object of the invention to provide a manner of forming and using such a tube, and to provide a container that has been provided with finish of such a tube.

In accomplishing the foregoing objectives, there has been provided, in accordance with a first aspect of the present invention, a hollow article comprising a polyester film having an overlapped, transparent, adhesively bonded seam region, wherein said polyester film comprises a polyester containing reactive groups.

In accordance with another aspect of the present invention, there is provided a container that is surrounded with an article as described above.

In accordance with another aspect of the invention there has been provided a process for the production of a container provided with a film-finish comprising the steps of:

a) placing a film comprising a polyester containing reactive groups around the container so that the ends of the film overlap at a seam,

b) applying a solvent-based adhesive to the film in the seam, and

c) removing the solvent and with the application of pressure and optionally heat, sealing the overlapping ends of the film, so as to form a film finish around the container.

There has been provided a further process for the production of a container provided with a film-finish comprising the steps of:

a) forming a film comprising a polyester containing reactive groups into an article such as a hollow cylinder or hollow truncated cone by bonding two overlapping ends with an adhesive,

b) placing the article around the container, and

c) shrinking the article onto the container by the action of heat.

Further objects, features and advantages of the present invention will become apparent from the detailed description of preferred embodiments which follows.

Detailed Description of the Preferred Embodiments

According to the present invention, a reactive group-modified polyester film, that has a bond seam and a partial overlap in the seam region where it is bonded by means of an adhesive, allows for the zone bonded by means of an adhesive to be and remain transparent.

The polymer films are useful, for example, as all-around labels, safety seals or sheaths and in other applications where transparency is a desired characteristic.

The polyester film according to the invention may be any known polyester, preferably transparent polyester films such as those based on polyethylene terephthalate (PET). Preferably the film contains more than 90% by weight of polyester, the polyester preferably being PET. The film can optionally contain conventional additives such as stabilizers, lubricants, antistatic agents or the like in the customary proportion depending on their purpose, i.e., generally up to about 10% by weight of the film.

The reactive group can be present anywhere along the polyester and be any reactive group known in the art. Preferably, reactive group-modified polyester films are used which have terminal reactive groups such as OH, CHO or COOH groups. Alkanediol-modified PET films, such as 1,3-propanediol-modified or ethylene glycol-modified PET films, have proved particularly suitable. Films of this type are obtainable, for example, under the name "PETCLEARYL (Hagner, Dornstätten, Germany) or VILLPET PETG films type 1003 (Stäger, Muri, Switzerland).

The polyester films can be single layer or multilayer; they can be unstretched or monoaxially or biaxially stretched; and they can be printed or unprinted.

The adhesive used to bond the overlap region is generally a solvent-based adhesive (i.e. an organic solvent) that has an affinity for the reactive groups

present on the polyester film surface. Furthermore, this adhesive should not cause substantial crystallization of the incipiently dissolved polyester. Solvents from the group comprising esters, alcohols, ketones, furans, hydrocarbons such as chlorinated hydrocarbons and aliphatic and cyclic hydrocarbons and mixtures of these substances with one another have proved particularly suitable. For example, esters that can be used are ethyl acetate or methyl acetate, alcohols that can be used are ethanol or propanol, ketones that can be used are methyl ethyl ketone, cyclohexane or acetone, furans that can be used are tetrahydrofuran or lower alkyl-substituted THF, chlorinated hydrocarbons that can be used are methylene chloride or 2,2-dichloroethane, and aliphatic or cyclic hydrocarbons that can be used are pentane, hexane or cyclohexane.

Surprisingly, it has been found that the reactive group-modified polyester films and in particular the alkanediol-modified PET films can be permanently bonded, with retention of the transparency of the bond zone, using solvent-based adhesives. The bond zones remain transparent even under the action of heat, such as is applied when shrinking such films onto containers. It was exceptionally surprising that no change in the transparency occurs even in a humid, warm atmosphere, such as occurs for example in pasteurization.

In this context, transparency is intended to signify that no cloudiness arises, for example, because of crystallization phenomena. The transparency can be measured or assessed, for example, by means of light scattering measurement (ASTM-D 1003-61, method A). In the case of the polyester films bonded according to the invention the transparency is generally in the range from 75 to 90%, preferably in the range from 80 to 90% (determined in accordance with ASTM-D 1003-61, method A).

The film of the present invention can be used in any desired application, and is particularly useful where it is desired to have a transparent film. When used for

all-around labeling, the best procedure for making the article is to place an appropriately sized, optionally printed polyester film strip as described above around the container to be labeled, for example, a bottle, so that the two ends of the film somewhat overlap. The length of the overlap zone is not critical but is in general 1 to 10 mm, preferably 3 to 7 mm. The solvent-based adhesive is applied to the film surface on one or both sides in this overlap zone and the seam is sealed, after evaporation of the solvent from the adhesive, with the application of pressure and, where appropriate, of heat.

In a further embodiment of the process, a tubular sleeve is first formed by shaping, and bonding, the film in the form of a hollow cylinder or, optionally, a hollow truncated cone with an overlapping seam. This tubular sleeve is then slipped around the container. The all-around label is then shrunk on to the container by the action of heat, for example, by means of hot air.

The container can be composed of any desired material, such as glass, metal or plastic, such as PVC, PS or PP, but preferably is made from the same material as the film so as to facilitate recycling. Thus, the container is preferably polyethylene terephthalate.

The invention is illustrated below with the aid of examples:

Example 1

A single-layer PET film monoaxially oriented in the transverse direction (PETCLEARYL, P100; Hagner, Dornstätten, Germany) was shaped to give a tube with a 3 mm overlap seam. One side of the seam was coated with THF and following a period of 1 to 5 sec for the solvent to evaporate, the seam was pressed together. After drying, the bond zone had a transparency of 80% (ASTM-D 1003-61, method A).

Example 2

The PET film shaped and bonded to form a tube, from Example 1, was shrunk on to a cylindrical bottle in a stream of hot air. The temperature of the hot air was 120 to 130°C (treatment time 4 sec). The bonded seam was transparent (80% according to ASTM-D 1003-61, method A) even after this shrinkage process.

What Is Claimed Is:

1. A hollow article comprising a polyester film having an overlapped, transparent, adhesively bonded seam region, wherein said polyester film comprises a polyester containing reactive groups.

2. A hollow article as claimed in claim 1, wherein said film is a polyester shrink-wrapped film.

3. A hollow article as claimed in claim 1, wherein said film is unstretched or monoaxially or biaxially stretched.

4. A hollow article as claimed in claim 1, wherein said polyester having reactive groups comprises polyethylene terephthalate.

5. A hollow article as claimed in claim 1, which has a transparency in the range from 75% to 90% in the seam region.

6. A hollow article as claimed in claim 1, wherein said film is printed.

7. A hollow article as claimed in claim 1, wherein said film comprises at least 90% of polyethylene terephthalate.

8. A hollow article as claimed in claim 7, wherein said reactive groups are selected from at least one of the group consisting of OH, CHO, and COOH groups.

9. A hollow article as claimed in claim 8, wherein said reactive groups are provided by reaction of the polyester with 1,3,-propanediol or ethylene glycol.

10. A hollow article as claimed in claim 1, wherein said seam region has a length of 1 to 10 mm.

11. A hollow article as claimed in claim 1, wherein said hollow article is a tube.

12. A hollow article as claimed in claim 1, wherein the adhesive used to bond said seam region is a solvent-based adhesive.

13. A hollow article as claimed in claim 12, wherein said solvent-based adhesive is selected from at least one of the group consisting of esters, alcohols, ketones, furans, and hydrocarbons.

14. An all-around label, safety seal or sheath for containers, comprising a hollow article as claimed in claim 1.

15. A container provided with a container finish, wherein said container finish comprises a hollow article as claimed in claim 1.

16. A container as claimed in claim 15, wherein said container comprises a polyester.

17. A container as claimed in claim 15, wherein said container comprises polyethylene terephthalate.

18. A process for the production of a container provided with a film-finish comprising the steps of:

a) placing a film comprising a polyester containing reactive groups around the container so that the ends of the film overlap at a seam,

b) applying a solvent-based adhesive to the film in the seam, and

c) removing said solvent and with the application of pressure and optionally heat, sealing the overlapping

ends of the film, so as to form a film finish around said container.

19. A process for the production of a container provided with a film-finish comprising the steps of:

a) forming a film comprising a polyester containing reactive groups into a hollow article by bonding two overlapping ends of said film with an adhesive,

b) placing the article around the container, and

c) shrinking the article onto the container by the action of heat.

20. A container produced by a process as claimed in claim 18.

Fetherstonhaugh & Co.,
Ottawa, Canada
Patent Agents

Abstract of the Disclosure

A hollow article formed from a film containing a polyester with reactive groups, whose ends have been bonded by an adhesive, results in a bonded region which remains transparent. The hollow article is useful as an all around label, safety seal, or sheath for containers.